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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company (U338E) for Approval of its 2012-2014 California Alternate Rates for Energy (CARE) and Energy Savings Assistance Programs and Budgets.

Application 11-05-017
(Filed May 16, 2011)

And Related Matters.

Application 11-05-018
Application 11-05-019
Application 11-05-020

ADMINISTRATIVE LAW JUDGE'S RULING ADMITTING THE ENERGY SAVINGS ASSISTANCE PROGRAM COST-EFFECTIVENESS WORKING GROUP'S WHITE PAPER AND ADDENDUM TO ESAP COST-EFFECTIVENESS WORKING GROUP WHITE PAPER

The attached final Energy Savings Assistance Program Cost-Effectiveness Working Group's White Paper which was released on February 15, 2013 (Attachment A) and Addendum To ESAP Cost-Effectiveness Working Group's White Paper which was released on July 15, 2013 (Attachment B) are ruled into the record of the above-captioned consolidated proceeding, for the Commission's consideration.

IT IS SO RULED.

Dated August 1, 2014, at San Francisco, California.

/s/ KIMBERLY KIM
Kimberly Kim
Administrative Law Judge

ATTACHMENT A

**ENERGY SAVINGS ASSISTANCE PROGRAM
COST-EFFECTIVENESS WHITE PAPER**

Energy Savings Assistance Program Cost-effectiveness White Paper

Submitted by the Energy Savings Assistance (ESA) Program
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Note: The views expressed in this paper may not reflect the personal views of any of the individuals listed above. In addition, some of the views expressed in this paper may not be shared by all of the individuals or organizations listed above.

February 15, 2013

I. Executive Summary

The Energy Savings Assistance (ESA) program¹ provides low income ratepayers with energy efficiency improvements to their homes. There is significant interest in demonstrating that the ESA program is both cost-effective in its provision of energy efficiency, and additionally, provides tangible value and benefits for low income ratepayers. However, parties have raised the concern that the current framework used to determine the cost-effectiveness of the ESA program does not adequately account for both energy savings and quality of life improvements, such as health, comfort, and safety benefits. In response to parties' concerns, D.12-08-044 directed Energy Division to convene the ESA program cost-effectiveness working group (Working Group) to examine the cost-effectiveness methods and tests used by the ESA program. The following white paper proposes some options for modifying the ESA program cost-effectiveness framework developed by the Working Group, summarized as follows:

1. Categorize each individual ESA measure as “equity” or “resource,” although measures that are difficult to categorize may be identified as “uncertain.” This will be used to determine which measures should be subject to the Equity Evaluation (see #3 below), and which measures should be included in certain proposed cost-effectiveness tests (see #2 below).
2. Base ESA program approval on the cost-effectiveness of the entire ESA program; use measure level cost-effectiveness results only as an informative tool. There are currently several proposals for new cost-effectiveness tests to use as a basis for ESA program approval. As yet undetermined is an appropriate cost-effectiveness approval threshold, which would be based on various combinations of existing and proposed tests.
3. Develop an “Equity Evaluation.” The Equity Evaluation will provide a qualitative analysis of ESA program measures to determine the extent to which any particular measure provides identifiable and specific quality of life benefits to participants. The Working Group will use non-energy benefits (NEBs) research and reports from public health and safety agencies as the starting point to develop criteria which define the health, comfort and safety benefits which accrue to participants. Utilities will report, as part of the cost-effectiveness analysis of the ESA program, whether each measure is likely to provide each benefit.

For the 2015-17 cycle, the Working Group will determine a list of health, comfort and safety criteria. Based on their knowledge of each measure, the investor-owned utilities (IOUs) will rate each measure, using a simple rating system (e.g., yes/no/maybe). During the 2015-17 cycle, the Working Group (or its successor) will work with stakeholders to develop a more sophisticated equity evaluation. This will likely involve a research study performed by an independent contractor who will conduct customer surveys to better determine the extent to which each measure has actually accomplished health, comfort and safety improvements.

¹ The ESA Program was formerly known as the Low Income Energy Efficiency (LIEE) program. D.08-11-031 and D.09-10-012 mandated that the other investor-owned utilities develop a new statewide name and brand identity for their low income programs, previously called LIEE. The IOUs worked with Energy Division to develop a new name, the *Energy Savings Assistance Program*, which was implemented in 2011.

4. Some modification of the NEBs calculation may be needed, to be determined as part of an ongoing stakeholder process. Possible modifications include adding sensitivity analysis, updating the NEBs study to try to obtain more accurate values, or calculating only those NEBs values that are both substantial and easy to calculate, and using an adder for the rest.
5. Reporting cost-effectiveness by household type. In addition to reporting the cost-effectiveness of the entire ESA program and performing an equity evaluation of individual measures, the IOUs will report cost-effectiveness information for groups of measures, based on types of households served.

The Working Group will incorporate comments received on this White Paper with its ongoing research, and present a more detailed proposal at (or before) a public workshop, which will be held by or before June 1, 2013. Final recommendations will be presented to the Assigned Administrative Law Judge by July 15, 2013, the deadline established in Decision 12-08-044.

II. Introduction

The Energy Savings Assistance (ESA) program provides low income ratepayers with energy efficiency improvements to their homes. Traditionally, California's low income energy efficiency programs have been as focused on providing equity and comfort as they have been on providing energy savings to low income customers. Thus, there is significant interest in demonstrating that the ESA program is both cost-effective in its provision of energy efficiency, and provides tangible value and benefits for all low income customers in each of the four utility service areas, particularly in these economically-challenged times.

However, parties have raised the concern that the current cost-effectiveness framework used to determine the cost-effectiveness of the ESA program does not adequately account for both energy savings and quality of life improvements, such as health, comfort, and safety benefits. Some parties suggested that the current framework does not provide accurate measurements of the cost-effectiveness of individual ESA measures. Other parties felt that additional cost-effectiveness tests, or additional reporting requirements, were needed to provide a more complete understanding of ESA program cost-effectiveness.

In response to parties' concerns, Decision (D.) 12-08-044 directed Energy Division to convene the ESA program cost-effectiveness working group (Working Group) to examine the cost-effectiveness methods and tests used by the ESA program. Specifically, D.12-08-044 directed the CE Working Group to review the following:

- What type of cost-effectiveness framework should the ESA program use? Should the cost-effectiveness analysis of the ESA program be determined by cost-effectiveness evaluation of the entire program? Should such cost-effectiveness analysis be done solely at the individual measure level to evaluate the cost-effectiveness of the individual measure to determine the approval of individual measure? Should such analysis be done using some type of hybrid approach, looking at both the cost-effectiveness of the program and its measures? Should such analysis be done using any other potential approach? And if so, what and how?
- Should the Commission continue to use the Modified Participant Test (PCm) and the Utility Cost Test (UCT) to measure the ESA program cost-effectiveness, or should the Commission instead (or additionally) use the Total Resource Cost (TRC) test? Do these tests require any modification to be better suited for use by the ESA program?
- Should all measures, both equity (including health, safety and comfort measures) and resource measures, be subject to cost-effectiveness analysis? How do we define which measures are considered resource measures and which are considered equity measures? Should they be treated differently? Should we have specific goals or metrics for equity measures? How should those goals or metrics be defined?
- What is the appropriate role of non-energy benefits, including equity factors such as health, safety and comfort issues, in the cost-effectiveness analysis for the ESA program? Which cost-effectiveness tests should include which non-energy benefits? How should

the various non-energy benefits be measured and treated? Are there additional non-energy benefits which should be included, or current non-energy benefits which should be excluded?

The following white paper proposes some options for modifying the ESA program cost-effectiveness framework developed by the Working Group. This white paper does not address the merits of the ESA program or the policy that it should be funded by all ratepayers. Rather, the purpose of this paper is to assess the adequacy of the current cost-effectiveness framework applied to the ESA program and propose some improvements.

The Working Group will incorporate comments received on this White Paper with its ongoing research, and present a more detailed proposal at (or before) a public workshop, which will be held by or before June 1, 2013. Final recommendations will be presented to the Assigned Administrative Law Judge by July 15, 2013, the deadline established in Decision 12-08-044.

III. Background

The First Energy-Related Low Income Programs: Health, Safety, Comfort, Heating and, later, Cooling Costs

In 1976, as a result of the 1973 OPEC Oil Embargo, the US Congress passed the Energy Conservation and Production Act which created the Weatherization Assistance Program (WAP) to be administered by the newly-formed Department of Energy (DOE). The program would "winterize" or "weatherize" low income dwellings in order to assist low-income households, including senior citizens living on fixed incomes and Social Security, who were especially hard hit by rising heating bills, especially in frigid climates.

The first DOE program weatherization providers dealt with the health and safety issues in cold winter climates by installing emergency and temporary low-cost measures such as covering windows with plastic sheets, and caulking and weather-stripping windows and doors. As the providers gained experience the program gradually included different types of weatherization measures, including storm windows, storm doors and attic insulation. However, it was a program designed primarily for cold climates. Not until 1994 were cooling measures, such as air conditioner replacements, ventilation equipment, and screening and shading devices, permitted in the DOE Weatherization Assistance Program.²

The next oil supply disruption came with the overthrow of the Shah of Iran in 1979. In 1981 Congress established the Low Income Home Energy Assistance Program (LIHEAP). In addition to allowing states the *option* to provide "weatherization" services, it primarily provides "one time" utility bill assistance to low income households. At first it provided assistance only for heating bills, but in 1984, the Human Services Reauthorization Act added a new goal to provide funds for cooling costs of low income households. This required shifting funds from solely cold-weather states to warm-weather states.

Thus, the first energy related low income programs were established to help low income households deal with the issues of health, safety, comfort, and energy costs.

Then, Providing "Equity"

In the 1980s the CPUC and the CEC approved ratepayer-funded, utility-administered energy audit, rebate, and low interest loan programs to subsidize the cost of the installation of weatherization measures in residential homes. In 1982, a study commissioned by PG&E³ showed that while low income households paid those subsidies in rates, they were unable or unwilling to participate in the programs. This meant that low income ratepayers would be subsidizing non-low income ratepayers while receiving little direct benefit. The Heath Report asked: With the amount of ratepayer money the Commission was spending trying to get low

² U.S. Department of Energy, History of the Weatherization Assistance Program.
http://www1.eere.energy.gov/wip/wap_history.html

³ The Final Report: Phase I Zero Interest Program Low Income Outreach Demonstration Project, conducted by the California/Nevada Community Action Association under contract with Pacific Gas and Electric Company, prepared by Richard Heath and Associates, Inc., April, 1982; generally referred to as "the Heath report"

income households to take out zero-interest loans, why not just weatherize the home at no cost to the low income occupant?

SDG&E agreed and, thus in 1983, for reasons of fairness, or *equity*, SDG&E implemented California's first IOU low income "direct weatherization" program to ensure that low income households received some benefits from the programs they helped fund through rates. It was called "direct" weatherization because it bypassed the steps of loans or rebates and installed the measure "directly." The list of eligible measures was based on the measures installed in the WAP and LIHEAP programs. Cost-effectiveness tests for measures were not required and utilities were generally instructed to strive to provide services in a "cost efficient" manner, that is, a reasonable and efficient use of ratepayer dollars.

Next, "Energy-Related Hardships"

In 1989 SB845 was signed into law (becoming PUCODE 2790) which told the Commission to direct IOUs to implement the low-income weatherization program "taking into consideration for all measures both the cost-effectiveness of the measures as a whole and the policy of reducing energy-related hardships facing low-income households." The bill was silent on what those "hardships" were but gradually Commission decisions and state legislation began to fill in the blanks.

The original idea, that "fairness" or "equity" dictates that low income households should not be required to subsidize non-low income households, grew to encompass the new legislative requirement to consider "energy-related hardships" when designing the low income program. It is now generally accepted that "equity measures" are those measures which are intended to deal with the issues of health, safety, comfort, and energy costs. Health, safety, and comfort are "non-energy benefits" of the program.

But is it Cost-Effective?

The ESA program, like all demand-side resources (energy efficiency, demand response, and distributed generation) must undergo a cost-effectiveness analysis. The basis of cost-effectiveness analysis of demand-side programs in California is the Standard Practice Manual (SPM), which outlines several different tests of cost-effectiveness, each based on a different perspective (e.g., the utility or other program administration, the participant, the participant and utility combined). Different combinations of costs and benefits are used for the different tests.

From the perspective of the participant, the primary benefit is bill savings. From the perspective of the utilities and ratepayers in general, the primary benefits are the avoided costs of supplying electricity. The avoided costs can be described as how much ratepayers would have to pay to build, maintain and operate the electric and gas networks, including power plants and transmission and distribution lines, to supply the electricity and natural gas that is being avoided by energy efficiency programs.

To determine the costs of these programs, we look at what would it cost to reduce demand. This includes utilities' costs of administering programs as well as the costs of purchasing and

installing the energy efficient equipment. Then, we compare the two to determine if we could avoid the costs on the supply side by investing in reducing the demand side.

The primary test used to determine the cost-effectiveness of most energy efficiency programs is called the Total Resource Cost (TRC) test. This test measures the costs and benefits from the perspective of the utility and the participant together. The costs are the utility's administrative costs and the capital costs of the energy-efficient equipment (usually referred to as the "measure costs"). The benefits are the avoided costs, as discussed above.

However, this framework is not totally applicable to low income programs. This is because in the low income program measures are installed not only for quantifiable energy reasons but also for hard-to-quantify reasons of health, safety, comfort, and bill assistance. In addition, the participant does not pay for the equipment installation. As a result, additional tests have been developed for the ESA program, as discussed in the next section

Modifying the Cost-Effectiveness Tests for Low Income Programs

SB845 was passed in 1988, becoming CA Pub. Util. Code § 2790 in 1989. CA PUCode § 2790(a) directed the Commission to consider "*both the cost-effectiveness of the services and the policy of reducing the hardships facing low-income households*" in designing energy efficiency programs for low income customers. In 1999, workshops were held regarding the limited applicability of economic tests to low income programs. Parties discussed the possibility of modifying the traditional cost-effectiveness tests that were used to assess low income energy efficiency programs to include non-energy benefits (NEBs).

The Commission's implementation of SB 845 expressed multiple goals of the program, which are still relevant today. D.00-07-020 stated "*Because this segment of the population needs bill savings the most, we should strive to maximize the participation of eligible participants and work to reduce their electric and gas bills as much as possible, within the constraint of limited funding. At the same time, to protect the interests of non-participating ratepayers that subsidize the costs of the program, we need to ensure that service delivery is as efficient as possible.*"⁴

In 2000, D.00-09-036 called for a technical subcommittee to be formed to explore developing a low income program cost-effectiveness test which would include NEBs. This Working Group's Phase 1 Report, filed on October 2, 2000, provided background and laid a foundation for future consideration of low income cost-effectiveness.

In 2001, D.01-03-028 ordered utilities to develop a cost benefit test that included NEBs, and to use it to assess both program and measure cost-effectiveness. The Low Income Public Purpose Test (LIPPT) model was developed by TekMRKT Works, Skumatz Economic Research, Inc. and Megdal Associates. This Phase 2 Report was filed by the Reporting Requirements Manual (RRM) Working Group in April 2001.⁵

⁴ D.00-07-020, mimeo, p. 36, reaffirmed in D.00-09-035, mimeo, p.14.

⁵The Low Income Public Purpose Test (LIPPT). Final Report. Prepared for the RRM Working Group Cost-effectiveness Committee. By TecMarket Works, Skumatz Economic Research, Inc., and Megdal and Associates. May 25, 2001.

In 2001, D.01-12-020 adopted the NEBs developed for the LIPPT model. However, rather than use the LIPPT model itself, D.01-12-020 instructed the subcommittee to update and modify the Utility Cost Test and Participant Cost Test to: a) evaluate low income energy efficiency cost-effectiveness on both a program and individual measure basis, and b) to capture non-energy benefits. The RRM Working Group/Standardization Team's Joint Report describing the updated tests was filed March 28, 2002.⁶

D.02-08-034 adopted the updated Utility Cost Test and Participant Cost Test and instructed that utilities use them in their program applications. The ACR issued on August 21, 2002 reiterated use of both the Utility Cost Test and Participant Cost Test as modified with NEBs to evaluate low income energy efficiency at both the program and measure level. Both the utility filings and the Standardization Team's preliminary report were filed September 30, 2002. The Utility Cost Test (UCT) and the Modified Participant Cost Test (MPT), adopted in D.02-08-034 are the cost benefit tests currently used by the California IOUs to analyze the low income energy efficiency programs and measures.

On February 24, 2003, the Commission approved a revised work plan for Phase 4 of the Low Income Energy Efficiency (LIEE) Standardization Project and Cost-effectiveness Studies. The resulting LIEE Measure Cost-effectiveness Final Report was filed June 2, 2003.⁷ (D.03-11-020 adopted the measures recommended in the June 2 report for PY2004 and concluded that new measures would be considered for the 2006 LIEE program.)

The ACR dated October 22, 2004 directed the Standardization Team to institute a process for considering new energy efficiency measures for the PY2006 program. In 2005, the Standardization Team solicited proposals for new program measures and assessed them using the cost-effectiveness criteria approved by the Commission. A report on the measure assessment was submitted on May 2, 2005.⁸ (D.05-12-026 approved the recommended new measures for the 2006 LIEE program.)

In 2007, the Commission began developing the California Energy Efficiency Strategic Plan. The low income program was included in this plan. In doing so, the Commission established that the earlier goals of the low income energy efficiency program would coexist with a renewed focus on energy savings. D.07-12-051 stated, *"Today we clarify that the complementary objectives of LIEE programs are to provide an energy resource for California, consistent with our 'loading order' that establishes energy efficiency as our first priority, while reducing low-income customers' bills and improving their quality of life."*⁹

This direction was incorporated into the Strategic Plan as *"The LIEE programs will be an energy resource by delivering increasingly cost-effective and longer-term savings."*¹⁰

⁶ LIEE Program and Measure Cost-effectiveness. Final report. Submitted by Cost-effectiveness Subcommittee of the RRM Working Group and Standardization Project Team. March 28, 2002.

⁷ LIEE Measure Cost-effectiveness Final Report. Prepared by LIEE Standardization Team. June 2, 2003.

⁸ Report on the Assessment of Proposed New Program Year 2006 Low Income Energy Efficiency Program Measures. Proposed by the Low Income Energy Efficiency Standardization Team. May 2, 2005.

⁹ D.07-12-051, p. 2.

¹⁰ California Energy Efficiency Strategic Plan, January 2011 update, Section 2, pp. 23-24.

In 2008, D.08-11-031 established new cost-effectiveness criteria for determining which measures could be in the program. In particular, the Commission adopted a threshold for future measure inclusion of a 0.25 benefit-cost ratio for both the MPT and UCT, but also established that existing measures with a less than 0.25 benefit-cost ratio on either the MPT or the UCT would be retained in the program. However, the Commission also deemed that the non-energy comfort, health and safety benefits of some measures outweighed their low cost-effectiveness results. Thus D.08-11-031, also stated that certain measures, such as furnace and water heater repair and replacement, and air conditioning and evaporative cooling (in hot climate zones only) could be included in the LIEE program without regard to their cost-effectiveness results, based on the health, comfort and safety benefits provided to participants.

Pursuant to D.08-11-031, a study was conducted in 2010 to look at the status of NEBs, research what other states are using, and report the value range. The report provided information on NEBs reported in other states and programs, including a table of reported values.¹¹ The study found that NEBs are very difficult to quantify, and no precise methods are being used. Many of the other values are reported as a percent of energy savings. The study team noted that any additional studies and customer surveys would cost much more than originally budgeted.

Hence, the ESA program has evolved into a program with multiple goals: 1) provide significant bill savings and improve the quality of life for low income customers, 2) extend energy efficiency as an energy resource, and 3) protect the interests of non-participating ratepayers by evaluating the program in terms of cost-effectiveness.¹² As a result, the current cost-effectiveness analysis of the ESA program is done from both the perspective of the utility and the participant.

Current Cost-effectiveness Tests Used by the IOUs

Currently, the IOUs report three cost-effectiveness test results: the Utility Cost test (UCT), the Modified Participant Test (MPT), and the Total Resource Test (TRC). Only the UCT and the MPT are used to determine which measures are included in the ESA program. The TRC is included in IOU Annual Reports and Applications for information purposes only.

Additionally, only the UCT and the MPT include non-energy benefits (utility NEBs in the UCT, for some utilities, and participant NEBs in the MPT). A modified version of the Low Income Public Purpose Test (LIPPT) model (developed in 2001) is used to estimate NEBs. The LIPPT model allows input of basic assumptions regarding NEBs, which are estimated on a per-household basis and then allocated across measures based on each measure's share of energy savings. Administrative costs are also allocated across measures based on the share of energy savings. The E3 Calculator for Energy Efficiency is used to calculate the other costs and benefits for the UCT and the TRC. The cost and benefits inputs used for these tests are shown in Table 1.

¹¹ Non-Energy Benefits: Status, Findings, Next Steps, and Implications for Low income Program Analyses in California. Skumatz Economic Research Associates and The Cadmus Group. May 12, 2010.

¹² see D.00-07-020, mimeo, p. 36, reaffirmed in D.00-09-035, mimeo, p.14. Also D.07-12-051, p. 2, and California Energy Efficiency Strategic Plan, January 2011 update, Section 2, pp. 23-24.

Table 1

Current ESA Program Cost-effectiveness Tests			
	TRC	MPT	UCT
Administrative costs	COST	COST	COST
Avoided costs of supplying electricity	BENEFIT		BENEFIT
Net Bill Reductions		BENEFIT	
Capital (measure) costs to landlords/3 rd parties	COST*		
Capital (measure) costs to utility	COST	COST	COST
Participant non-energy benefits		BENEFIT	
Utility non-energy benefits			BENEFIT

**Costs of third parties have been included, although not consistently, by some (but not all) utilities.*

The IOUs report cost-effectiveness test results for the portfolio and for each measure by fuel type, housing type and climate zone in their program applications. Continuing ESA measures are required to have a minimum benefit-cost ratio of 0.25 on either the UCT or MPT. New measures are required to have a minimum benefit-cost ratio of 0.25 on both the UCT and MPT. In cases where the measure does not pass but does provide health or safety benefits, it may be kept in the program regardless of the test result. The process used to determine whether to keep measures with a less than 0.25 benefit-cost ratio (other than those measures specifically included in D.08-11-031), has historically been somewhat informal – although this determination has been directed by the Commission and based on stakeholder input, it has been made on an individual measure basis rather than any standardized method.

While the ESA program, unlike other demand-side programs, includes non-energy benefits which accrue to participants and the utilities, it has not been considered appropriate to include NEBs which accrue to society at large, such as environmental benefits. However, regulatory and legislative decision makers consistently point to job creation as a benefit of low income programs. For example, Public Utilities Code section 327, specifically addressing the ESA program, directs that, “to the extent practical,” program administrators shall, “(a) (3) Encourage local employment and job skill development.” The California Energy Efficiency Strategic Plan envisions “the growth of a trained LIEE [ESAP] workforce.”

The Working Group has not yet given this issue enough consideration to reach consensus, although some Working Group members, including TELACU, Maravilla, and ACCES, strongly believe job creation should be a factor considered by the Commission when determining ESA Program design. Although these factors may be hard to measure, and may have off-setting costs, those parties believe they should be a part of the decision-making process for Commissioners. Where the Working Group does have consensus is in its support for the current efforts in the wider demand-side cost-effectiveness proceeding to determine how to value the societal non-energy impacts of demand-side programs.

IV. Proposed Modifications

As noted above, parties in the low income proceeding have questioned whether the current cost-effectiveness tests and methods adequately account for both energy savings and quality of life improvements, such as health, comfort, and safety benefits.

A major concern is that many of the individual measures in the ESA program provide energy savings, but some do not. Those measures which provide no or few energy savings are generally referred to as “equity” measures, whereas those which provide some level of energy savings are called “resource” measures. However, there is no clear or consistent definition of a “resource” measure – for example, how much energy savings does it need to be considered a “resource?” Neither is there a clear or consistent definition of an “equity” measure – some measures are included in ESA simply because some stakeholders believe that they provide health, comfort and safety benefits to participants.

In addition, even when it is universally agreed that a particular measure is an equity measure (i.e., that it is providing an essential service to low income ratepayers that all stakeholders agree should be provided), there is no way to determine the extent to which health, comfort and safety benefits are being provided. This means that even when it is agreed that a group of measures provide important benefits to low income ratepayers, it is difficult to determine which of those measures should be included in the ESA program, since we have no clear or consistent method of determining their *relative* value.

Another frequent criticism is that the requirement to provide a benefit-cost ratio for each ESA measure is giving us a distorted view of the value of these measures. Because both administrative costs and non-energy benefits are allocated to the measures in proportion to the measure’s energy savings, resource measures receive a disproportionate share of the costs and the non-energy benefits. This distorts the analysis of all the ESA measures.

Parties have also expressed the need to improve several other aspects of the cost-effectiveness framework, such as the way NEBs are calculated, the tests which are used to determine cost-effectiveness, and the way in which cost-effectiveness results are reported.

The Working Group proposes five modifications to the ESA program cost-effectiveness framework which we believe will help remedy some of these problems.

Proposed Modification 1: Categorizing Measures as “Equity” or “Resource”

In considering ways to improve ESA program cost-effectiveness, the Working Group started by trying to assess what benefits each measure in the program provides to program participants. Because the ESA program provides both energy savings and improved quality of life (i.e., health, comfort, and safety), the approach taken was to categorize program measures as either “resource” measures (those that provided measureable energy savings) or “equity” measures (those that provide relatively small energy savings but were widely accepted as important measures for health, comfort or safety). This approach is intended to give program administrators, evaluators, and stakeholders a better idea of why a measure is included in the

ESA program. Because not all of the program measures readily fall into one category or another, a third category of “uncertain” measures was allowed when there was sufficient uncertainty about the category. For example, past evaluations have reported energy savings for some measures in only certain climate zones or housing types. In addition, the average energy savings for ESA measure installations may change over time. SDG&E reviewed the typical energy and non-energy benefits that were allocated to the various measures in the last analysis and suggested the preliminary categorization shown in Table 2. **Note this list is provided only as an example.**

Table 2: SDG&E’s Proposed Preliminary Measure Categorization

Category	Measure
Equity	Furnace repair or replace
Equity	Hot water heater repair or replace
Equity	Air conditioning in hot climate zones
Resource	Lighting
Resource	Refrigerators
Resource	Hot water conservation measures
Resource	Clothes washers
Resource	Microwaves
Resource	Smart Strip
Resource	Furnace pilot light conversion
Resource	Central AC Tune-up
Uncertain	Air Sealing
Uncertain	Attic Insulation
Uncertain	Duct Test & Seal
Uncertain	Furnace Clean & Tune
Uncertain	Air conditioning in milder climate zones

Another possible method, proposed by DRA and TURN, would be to define a resource measure as any measure with verified energy savings, regardless of whether or not it also provides health, comfort and safety benefits. An equity measure would be defined as a measure with no measurable energy savings (perhaps even increasing energy consumption) but providing health, comfort and safety benefits. Table 3 shows an example of a designation of this type. Note that a few measures would be designated as both, depending on the circumstances surrounding the measure. Note also that other Working Group members have expressed the opinion that while certain measures, such as repair and replacement of hot water heaters and air conditioners, have the potential to save energy, previous evaluations of the ESA program have shown that on average these types of measures have not resulted in energy savings because of customer behavior (i.e., customers tend to use more hot water and AC after their appliances have been repaired or replaced).

An additional possible method for measure categorization would be the use of relative cost-effectiveness rankings to define equity or resource measures. Since the utilities already perform a measure-level cost-effectiveness ranking in their program applications, this could serve as a way to define equity and resource measures. The measures that in the past did not achieve the required threshold for cost-effectiveness, but were included in the ESA program for other

reasons (referred to as “add-back measures”), could perhaps be considered to be equity measures, whereas the measures which did meet the cost-effectiveness requirements could be perhaps be considered resource measures. One difficulty with this method, however, is that the list of add-back measures has changed frequently in the past. The utilities most recently filed lists of these measures on October 1, 2012 in proceeding A.11-05-017.

Table 3: DRA and TURN’s Proposed Preliminary Measure Categorization*

RESOURCE		EQUITY	
Category	Measures	Category	Measure
HVAC	Heating System Cooling System (A/C) Standing Pilot Evaporative Cooler Duct Sealing A/C Time Delay Relay Program. Thermostat	Mitigation of a hazardous condition associated with gas appliance	Repair/replacement of faulty gas appliances
Infiltration/Building Shell	Caulking, Weather-stripping, Outlet Cover Plate Gaskets, AC Cover, Insulation	Proper ventilation, consideration of outdoor and indoor air quality	NGAT, other air quality tests, asbestos removal, lead safe practices
Water Heating	Water Heater Faucet Aerator Low-Flow Showerhead Thermostatic Shower Valve Tank & Pipe Wraps	Safety enhancements	Smoke alarms, carbon monoxide alarms, outdoor lighting, CFL disposal information
Lighting	CFLs, Hard Wired CFL fixtures, Occupancy sensors, LED nightlights	Bill Management	Energy Education
Plugload & Appliances	Smart Strips, Clothes Washer and Refrigerator & Freezer Recycling/Replacement, Microwave Ovens		
Behavioral	Energy Education, Training on Product Use and Maintenance		

**not all of the measures in this example are current ESA measures.*

The Working Group has discussed these and other possible approaches to defining resource and equity measures, and has assigned a subcommittee to continue to refine these definitions. A more complete analysis, which will include all the measures from the four IOUs, will be completed by the subcommittee. This analysis will incorporate stakeholder feedback and be presented to stakeholder at (or before) the planned workshop.

Proposed Modification 2: Base ESA program approval on the cost-effectiveness of the entire ESA program, with possible modification of cost-effectiveness tests used for program approval

The Working Group proposes that ESA program approval be based on the cost-effectiveness of the entire ESA program, rather than approving individual ESA measures using measure-level cost-effectiveness. Measure-level cost-effectiveness results should be used as an informative tool which affects ESA program design.

The Working Group has not yet been able to reach a consensus recommendation on the best cost-effectiveness test or threshold appropriate for ESA program approval, nor on whether certain tests should be used for ESA program approval, and other tests to inform program design. The following options lay out the working group's initial thoughts on possible modified cost-effectiveness tests and approval thresholds. The Working Group will continue to discuss this issue to try to reach consensus and provide a specific recommendations to the Commission.

Proposed New Cost-effectiveness Tests

Most Working Group members believe there is a need for new cost-effectiveness tests, which are proposed below. SCE has proposed a modified version of the TRC which would include all costs and benefits associated with the ESA program, and DRA has proposed several tests which do not include any NEBs.

DRA's proposal is based upon the view that cost-effectiveness tests should express various perspectives, in keeping with the goals of the ESA program. DRA believes that since participant wellbeing remains the priority of the program, even with the recent greater emphasis on resource goals that is discussed above, the primary cost-effectiveness test should reflect this perspective. An additional cost-effectiveness test should incorporate all viewpoints, including both participants and non-participants. In some respects, the UCT and MPT capture these viewpoints. For example, the MPT partially expresses the participant perspective, in that it uses the benefits accruing to the participants. However, because the cost inputs to the MPT are those of the non-participant, DRA believes that the MPT is not useful for determining the cost-effectiveness of the ESA program. The UCT expresses the perspective of the program administrator, which DRA believes is synonymous with the perspective of the non-participating ratepayer.

DRA believes that another problem with the UCT and MPT is that they each contains only a portion of the NEBs. Because of this, it is not clear how much of the participants' benefits accrue via energy savings, and how much accrue via NEBs. It is important to all ratepayers that we know how much of the ESA program benefits will offset utility generation, and how much will result in participant bill savings. DRA believes that at least one test should omit NEBs so as to be able to compare results with other tests that include NEBs. This will give us more information about impact of NEBs on ESA program cost-effectiveness.

Since the perspective of the ESA program participant is difficult to express, it may be best expressed in combination with other perspectives. The test that captures is design to capture all perspectives is TRC test. However, relying solely on the TRC to determine ESA program cost-effectiveness does not prioritize participants' benefit, which is the primary goal of the ESA

program. DRA believes that the only way to prioritize participants' benefit is to use a test that captures the participant perspective as the primary cost-effectiveness test. DRA believes that it is critical to have the cost-effectiveness tests properly aligned with goals, because the test results should motivate specific program changes.

DRA proposes that one of the following three options be used to capture the ESA program participant perspective:

- Considering participant net benefits
- The Participant Bill Savings Test
- The Resource TRC

Participant Net Benefits

Other demand side programs measure cost-effectiveness from the participant perspective using the Participant test, which includes all costs incurred by and benefits accruing to program participants. A problem specific to the ESA program is that participants do not pay anything for the program. Because participant costs are zero, it is not possible to determine a useful benefit cost ratio using the Participant test. However, it would be possible to look at the magnitude of the participant net benefit, which consists of the participant bill savings. DRA believes that it may also be useful advantageous to calculate this net benefit using both the discounted rate that most low income customers pay and the regular residential rate, to allow comparisons across programs.

Participant Bill Savings Test

The participant bill savings test compares participant bill savings with the administrative and measure costs of the ESA program. It differs from the MPT in that it does not include participant NEBs and it would only be applied to resource measures. It is designed to narrowly focus on the portion of participant benefits accruing to participants in the form of bill savings by restricting the analysis only to measures that can reasonably be expected to deliver energy savings.

DRA believes that this test is needed to focus on tangible bill savings of the participants. The ESA program is often pointed to as a means to helping low income households make their energy bills manageable. The Participant Bill Savings test could be used to test this claim. DRA believes that although the Participant Bill Savings test may have drawbacks it is an improvement on the MPT because it is more transparent, in that it provides a clear picture of how participants' bills will be affected by the ESA program.

One drawback of the Participant Bill Savings test is that it has the same flaw as the MPT, in that it does not clearly represent the participant perspective because of the lack of participant costs. However, it does show whether the ESA program efficiently transfers funds received from non-participants to the ESA program participants via bill savings.

If the Participant Bill Savings test is used, the question remains of whether to calculate bill savings using the regular residential rate or the discounted residential rate that most low income customers pay. DRA believes that it may be advantageous to calculate this benefit using both the discounted rate and the regular residential rate to allow comparisons across programs.

The Resource TRC

The Resource TRC is identical to the traditional TRC used for all demand-side programs, but would only include resource measures. DRA believes that, like the Participant Benefits test, the Resource TRC is a way of prioritizing participant bill savings. DRA believes that even though the benefits used are avoided costs, it will still test whether the group of resource measures can reasonably be expected to provide bill savings to participants. Its advantage over the Participant Benefits test is that it is consistent with the way cost-effectiveness is calculated for other demand-side programs.

DRA believes that since the primary purpose of resource measures is to produce energy savings, reduce carbon emissions, and avoid supply side costs, then they should be evaluated accordingly. DRA believes that at least one ESA program cost-effectiveness test should focus solely on the resource measures, because they are designed to produce energy and bill savings. However, the Resource TRC does not use bill savings of low income households, which are based on discounted retail rate, and so avoids possible underestimation of benefits that is likely to result from use of the Participant Bill Savings test. Although the benefits used in the Resource TRC are avoided costs, which are lower than retail rates, the Resource TRC still captures energy savings. However, rather than assigning a flat value to each unit of energy saved, the avoided cost value depends on other factors, such as the level of energy consumption at different times and the hourly variation in energy prices. Even though the Resource TRC uses benefits which are lower than actual participant bill savings, DRA believes this is an acceptable tradeoff because it overcomes other problems inherent in the Participant Bill Savings test.

The Modified Resource Test

SCE has proposed the Modified Resource Test, which is a modified version of the TRC test which includes participant and utility NEBs as well as “copayments,” which are the portion of the measure costs which are paid by landlords or third parties. This test would include all the costs and benefits, both energy and non-energy, associated with the ESA program, SCE believes it is therefore comparable with the TRC currently used for evaluating other energy efficiency programs.

SCE believes that it is logical to start with the TRC test, then add the participant and utility NEBs to account for health, safety, and comfort benefits, which is a goal of the ESA Program. SCE believes a test based on the TRC, which is used for all demand-side programs, with modifications appropriate to the ESA program, provides a strong foundation that will facilitate acceptance of this test as a means to evaluate the total resource efficiency of the ESA Program.

Table 4

ESA Program Cost-effectiveness Tests						
	Current			Proposed		
	TRC	MPT	UCT	Modified Resource Test	Participant Bill Savings Test	Resource TRC*
Administrative costs	COST	COST	COST	COST	COST	COST
Avoided costs of supplying electricity	BENEFIT		BENEFIT	BENEFIT		BENEFIT
Net Bill Reductions		BENEFIT			BENEFIT	
Capital (measure) costs to landlords/3 rd parties	COST**			COST		
Capital (measure) costs to utility	COST	COST	COST	COST	COST	COST
Participant non-energy benefits		BENEFIT		BENEFIT		
Utility non-energy benefits			BENEFIT	BENEFIT		

**The proposed Resource TRC has the same cost and benefit inputs as the current TRC, but includes resources measures only.*

*** Costs of third parties have been included, although not consistently, by some (but not all) utilities.*

Once it is determined which of the existing and proposed cost-effectiveness tests are the most useful and appropriate for determining ESA program approval, we can then determine the best threshold to recommend for approval. Several questions have been raised by Working Group, members and require continuing discussion and stakeholder input before final recommendations can be made. These questions include:

- Should the threshold for ESA program approval be “firm” (e.g. the benefit-cost ratio on a particular test or tests must be greater than a certain number), or should it be based on past performance (e.g., the benefit-cost ratio on a particular test or tests must be greater in one year than it was in a previous year).
- To what extent should the threshold for ESA program approval be based on tests which include only resource measures, and to what extent on tests which include both resource and equity measures?
- Which of the existing or proposed tests should be used for ESA program approval? Should only one test be used for approval, with others used for informational purposes only? Or should some combination of two or more tests be used? If we use a combination of tests, how should they be weighed?
- What are the results when existing cost and benefit data from previous ESA program cost-effectiveness analyses are used to determine benefit-cost ratios using the proposed tests? Do those results indicate or suggest which tests, or combinations of tests, are the most useful or appropriate for determining a threshold for ESA program approval?

The Working Group is continuing to discuss possible combinations of these three proposed tests and the three current tests to determine a recommendation as to the best approach for ESA program approval, and will make recommendations in the future after more stakeholder input has been received.

Proposed Modification 3: Develop an “Equity Evaluation”

As discussed above, in addition to providing a certain level of energy savings to program participants, the ESA program strives to improve the lives of low-income ratepayers by improving their homes beyond cost-effective energy efficiency. However, currently the program lacks a formal and consistent procedure for determining the extent to which the individual ESA measures are providing these improvements to program participants. The Non-Energy Benefits (NEBs) values included in the cost-effectiveness analysis do provide some of this information, but only for those health, comfort and safety benefits which are quantifiable, and only at the program level. The Working Group believes it is essential, in terms of improving program delivery and design to maximize benefits for all program participants, to develop a new type of evaluation tool to determine the relative value of the various ESA measures. We are proposing a new method to determine the extent to which these “equity measures” achieve improvements in the health, comfort and safety of program participants in order to inform program needs and cost-effectiveness for the 2015-2017 program cycle.

Categorization of the measures offered through the ESA program will ensure that the subsequent evaluation is considering an agreed upon list of equity measures. Prior to conducting an evaluation, it needs to be determined which ESA measures should be subject to the equity evaluation: (1) all ESA measures, (2) only those measures which are deemed to be “uncertain” (reflecting current uncertainty as to whether they are equity or resource measures), or (3) all measures which are NOT resource measures (i.e., equity measures and uncertain measures). As discussed above, a Working Group subcommittee has done some preliminary work on this and will be submitting a proposal for measure categorization subsequent to release of this whitepaper.

An outstanding issue which will need to be resolved is whether subjecting any particular measure to both a traditional cost-effectiveness evaluation using the UCT, MPT, or other test which includes non-energy benefits, and then subjecting the same measure to an equity evaluation, which is essentially a qualitative evaluation of non-energy benefits, is appropriate. DRA has expressed a preference that the non-energy benefits associated with measures should undergo either a quantifiable or qualitative evaluation, but not both.

There are 3 sets of primary questions the Working Group seeks to answer as part of an Equity Evaluation, the first of which the Working Group is already actively examining (as discussed above):

1. *What are the distinctions between equity measures and resource measures?* One way to distinguish between equity and resources measures is by the level of energy savings they provide, where resource measures provide some level of energy savings, and equity

measures provide little or no energy savings. While most measures provide some level of savings, those savings are not equal for all measures, and some measure savings are negligible. The Working Group would establish a threshold at which a measure is defined as either an equity (low or no-savings) or resource (relatively high savings) measure. Alternatively, equity measures may be classified as those which provide some level (which would need to be determined) of health, comfort and safety benefits, based on metrics which would be determined by the Working Group. Once measures are determined to be “equity” or “resource” how do we then measure their effectiveness?

2. *How are “health,” “comfort,” and “safety” defined?* Other organizations, such as public health agencies, have definitions of these terms. The Working Group would determine how applicable these existing definitions are to the measures specific to the ESA program and whether they are consistent with the goals of ESA program. The Working Group may use existing NEBs research to help define health, safety and comfort. How can the existing NEBs research be leveraged to define health, comfort, and safety in the ESA program? How do we use the definitions we develop to determine health, comfort and safety criteria which could be used to measure equity value?
3. *Based on the equity measure criteria, how are measures within the ESA program assessed for their contributions to the health, comfort, and safety of ESA program participants?* Should the various criteria be weighted? If so, how? How should we measure whether measures meet each criterion? Are there also negative benefits (costs) attributable to some measures?

In consideration of the set of questions listed above and time constraints in this proceeding in regard to program planning needs for the 2015-2017 budget cycle, the Working Group proposes the following approach, which it believes is sufficient based on time constraints vis a vis program planning for the next ESA program cycle.

Basic Equity Evaluation

The Working Group proposes the establishment of a stakeholder process which would, over the short-term, establish criteria for “health, comfort and safety” that would be used to define equity by the IOUs for the 2015-2017 application process. (The Working Group acknowledges the importance of “education” as a component of the ESA program and, based on its continued work, may decide to include it for consideration as part of the equity evaluation. While educational efforts have, in the past, been included as part of the ESA program administration costs, it may make more sense to categorize them as “equity measures.” Additionally, an energy education study authorized by D.12-08-044 is currently underway that may address energy education considerations.) To establish these criteria, the Working Group may leverage research conducted in and for other jurisdictions, including existing NEBs research, similar work done by public agencies (including health, fire and home safety research), and research performed by public advocacy groups such as AARP. The initial results of the literature review, including proposed draft criteria and their application to equity measures as a means of grouping measures by whether or not they provide some level of health, comfort and safety, would be presented to stakeholders in a workshop held by or before June 1, 2013. At the workshop, stakeholders would be able to review and comment on proposed criteria and their relevance to specific measures, which would be revised and finalized based on stakeholder input.

An example of a basic equity evaluation is shown in Table 5 below. Note that these are sample criteria shown for explanatory purposes only. More definitive criteria, based on the literature review, will be proposed by the Working Group in the coming months.

In the basic equity evaluation, each ESA measures would be given a yes, no, or maybe score by the IOUs. These would be proposed in each IOU's application, as a reflection of their judgment and knowledge of these measures. Other stakeholders could then offer their own perspective on the IOUs' judgments in their comments and protests.

Table 5: Example of a Basic Equity Evaluation

Measure Description: Replacement widget in Climate Zone 32		
Health	Reduced extreme temperatures	Yes
	Improved indoor air quality	Yes
Comfort	Better lighting	No
	Decreased noise	Yes
	Fewer moves	Maybe
Safety	Decreased likelihood of fire	Yes
	Improved building structure	No

Once the criteria are finalized and applied to the measures as suggested above, the measures may then be grouped for evaluation purposes. Some measures may be evaluated either statewide or by utility (such as lighting), while others (HVAC, for example) would need to be assessed by climate zone (or more locally, if feasible) to determine their equity benefits. Once measure groupings are finalized, the IOUs would then apply these criteria to specific ESA program measures by employing a simple “yes/no/maybe” framework to answer the question of “does this measure meet these criteria?”. This evaluation recognizes time constraints inherent in the proceeding and assists the IOUs as they move ahead with program planning for the 2015-2017 applications.

Post 2015-2017 Equity Evaluation

The Working Group proposes that during the 2015-17 program cycle, we work on developing a more sophisticated equity evaluation model, which could be used in subsequent program cycles. This model would rely on more detailed criteria and a measure-based assessment implemented by an independent evaluator using participant surveys in place of the IOUs' assessments. The table below is included as an example of what this more sophisticated evaluation may look like, in terms of the level of detail of the health, comfort and safety criteria, the weighted importance of those criteria, and a score that reflects how each measure meets the criteria. In the example below, a detailed, standard list of criteria is established, with a weight given to each one depending on their relative importance. For each measure (or group of measures), participant surveys are used to develop a “score” for each criterion – in the example below we have used scores of 1, 2 or 3 to represent whether low, medium or high levels of each benefit resulted from the measure. We then multiply the weight by the score for each criterion, then add the results to get a total score for each measure.

For example, the measure “Replace Widget in Climate Zone 32” scores high in certain health, comfort and safety criteria and poorly in others, resulting in an overall total score of 64 for the measure. A broad range of measures and related scores could then be reviewed in order to determine which measures merit inclusion in subsequent program cycles.

Table 6: Example of a More Sophisticated Equity Evaluation

Measure Description: Replace widget in Climate Zone 32				
Category	Criteria	Weight	Score	Total
Health	health criterion tbd	3	3	9
	health criterion tbd	3	2	6
	health criterion tbd	2	0	6
	health criterion tbd	2	1	2
	health criterion tbd	1	3	3
	health criterion tbd	1	1	1
Comfort	comfort criterion tbd	2	0	0
	comfort criterion tbd	2	2	4
	comfort criterion tbd	3	1	3
	comfort criterion tbd	2	2	4
	comfort criterion tbd	3	3	9
	comfort criterion tbd	1	0	0
	comfort criterion tbd	1	2	2
	comfort criterion tbd	1	2	2
Safety	safety criterion tbd	3	1	3
	safety criterion tbd	2	0	0
	safety criterion tbd	1	2	2
	safety criterion tbd	1	0	0
	safety criterion tbd	2	3	6
	safety criterion tbd	2	1	2
	safety criterion tbd	1	2	2
TOTAL				64

Typically, in the low-income proceeding, the IOUs propose studies and the Commission either approves or denies the proposal and sets aside the study budget. In some instances, the Commission has proposed studies not originally envisioned by the IOUs. Either way dedicated specific funds are allocated for the studies. By including a proposal in this whitepaper, the Working Group seeks to establish the record necessary to inform a subsequent Phase II ALJ ruling that will order the study and set aside funds. The IOUs would propose such a study in their 2015 applications and should consider either of the following approaches:

Option 1: Energy Division and the IOUs select a consultant to conduct a California-specific approach that would essentially start from scratch to define and evaluate equity measures within the ESA program. While this approach might consider research performed in other jurisdictions, it would essentially be “micro-level” level and unique to California, producing a distinct set of definitions, equity values, and measurement for California.

Option 2: Rely on the Working Group to answer what are essentially phases 1 and 2 of the research (see questions 1 and 2 above), then select a consultant to take the Working Group’s

findings and expand them to determine how measures within the ESA program contribute to the health, comfort and safety of ESA program participants as noted in question 3. This approach warrants consideration in that it would be more cost-effective than a micro-level approach; however it may present some challenges with regard to consistency and adherence to standard evaluation approaches, as difficulties may arise from a two-phased research approach that has the Working Group conducting Phases 1 and 2 and an independent evaluator conducting Phase 3.

While IOU judgments regarding whether ESA program equity measures are providing certain levels of health, safety and comfort may be useful in a short-term evaluation based on time constraints and program planning needs related to the 2015-2017 application process, independent evaluation research as proposed here would be more useful for subsequent program planning, delivery and evaluation efforts. Research that moves beyond IOU judgment calls to rely instead on in-depth participant surveys can provide more thorough and robust information on the specific benefits engendered by ESA program equity measures. Consequently, the IOUs and program participants will mutually benefit from research findings that should lead to improved program design, measure offerings, and program satisfaction and allow the ESA program to continue to strive for improved health, comfort and safety for low-income participants. It would be particularly beneficial for this research to be conducted in the earlier phases of the 2015-2017 program cycle so that it may inform program planning efforts for the next ESA program cycle.

Proposed Modification 4: Modification of the NEBs calculation

Non-energy benefits (NEBs) have been included in the cost-effectiveness analyses of the California IOU low-income program since 2003. In 2001, TecMarket Works with Skumatz Economic Research, Inc. and Megdal and Associates completed a study for the Reporting Requirements Manual Working Group that included a model designed to test the cost-effectiveness of low-income programs with NEBs. In 2003, Itron, Inc. modified the model to use with the Low Income Energy Efficiency (LIEE) program. The IOUs have been using the model, with some minor modifications, since then.

In 2010 Skumatz Economic Research Associates, Inc. completed a scoping study designed to evaluate the use of NEBs in other low-income programs and provide recommendations for updating the methodology used for the LIEE (now ESA) program. The work scope consisted of an extensive literature review and synopsis of relevant ranges of values used in other programs.

The results of the study showed that the current NEB values used by the utilities for the most part fell within the range of values reported from other programs, although in some cases the range was broad. The study results also indicated that for the most part the NEBs being used were difficult to estimate, that the values were inconsistent with large variances and would require additional expensive studies to quantify with any reliability. Table 7 illustrates some of the results.

Table 7: Example of NEB Value Ranges from SERA Study

NEB	Value Range from SERA Study
Fewer reconnects	\$0.03 to \$0.08
Fewer shutoffs	\$0.03 to \$12
Fewer calls to utility	\$0.18 to \$0.30
Moving costs / mobility	< \$1
Net benefits for comfort & noise	\$15 to \$20
Fewer illnesses and lost days from work/school	\$4 to \$12
Property Value benefits	\$3 to \$20
Fewer fires	\$0.02 to \$0.16
Water/sewer savings	\$4 to \$15
Total	\$26 to \$80

Recommendations for changing or updating the methodology for estimating NEBs in the cost-effectiveness analyses were considered and included the following:

1. Continue to use the same model and NEB values that have been used since 2003 with no changes or only minor updates where feasible.
2. Continue as above with the addition of sensitivity analysis on key NEBs, such as “comfort and noise,” whose values are relatively high.
3. Fund a study that will provide updated values for the NEB calculations that are currently used. The study would likely require extensive customer surveys and analysis.
4. Calculate only certain NEBs which are substantial and easy to calculate and use an adder to estimate any remaining NEBs.
5. Use an adder to estimate all NEBs (this was the most common methodology found in the SERA study literature search).

All of these options have merit. Options one and two require the least amount of additional research and cost. However, parties have voiced reasonable concern that the values currently used to calculate many of the NEBs are not only outdated but in many cases based on unsubstantiated assumptions. The third option, a study to update the values, would be the most expensive option but also the only option to result in updated specific values for NEBs related to the ESA program. The fourth and fifth options, involving an adder, would also require additional research but would be less expensive than option three.

To further describe the fourth option, the NEBs that could easily be measured directly include water savings and property values for participants and the reduced rate subsidy for utilities. Water savings would be measured by estimating the average gallons of water saved per water measure and an average retail water rate. Property values would continue to be estimated using the average cost of minor home repairs provided in the program. The remaining NEBs would then be estimated with an adder, and would be expected to include the net benefit of fewer fires, fewer illnesses, comfort, and reduced hardship for the participant and reduced cost for arrearages and fewer customer calls for the utilities. In addition, any other net non-energy benefits not explicitly described in this paper would be included in the adder estimation.¹³

¹³ Other NEBs from the 2003 model that were found to be so low in value they could be eliminated from the analysis with minimal effect included fewer shutoffs, fewer calls to the utility, fewer reconnects and moving costs

The SERA study reported that where adders were used in other programs, they covered a broad range and their values are mostly arbitrary. Additional research would be needed to develop an appropriate adder for the ESA program. Some of the questions to be researched include a methodology for estimating the adder, the basis the adder will be applied to, and the possible need for different adders for different mixes of measures or fuel types.

One approach for developing a potential adder would involve looking at each of the utilities' analyses for the PY2012 to 2014 filing and assessing the NEBs, energy savings and bill savings that were allocated to various measures and measure groups. This would provide information on what a typical adder would have been to produce the PY2012 to 2014 results. While this approach relies on what has been done in the past, it would provide at least a starting point and further qualitative considerations could be evaluated to either increase or decrease the result.

This approach could be addressed within the statewide working group in 2013. Alternatively, a study could be funded to develop an appropriate adder that would include additional research or more comprehensive analyses.

Proposed Modification 5. Reporting cost-effectiveness by household type

This proposal, put forth by DRA, is to add a reporting requirement that requires that cost-effectiveness results be grouped by household type, as well as reported for individual measures. This would provide a more concrete picture of the level of cost-effectiveness achieved by the ESA program, by grouping cost-effectiveness results by approximately twelve groupings of dwellings receiving program services. These groupings will be defined by dwelling and/or occupant characteristics and the climate conditions surrounding the dwelling. A Working Group subcommittee discussed this proposal and agreed that the additional analysis could be completed in the near future, and that the data to perform the analysis is available.

The utilities are currently required to report ESA program data based on similar groupings. With some additional analysis, the groupings could be further broken down by climate areas. Having these groupings would allow the opportunity of further understanding how the costs and benefits differ across these groups. On the benefits side, DRA believes that the current energy savings estimates, which are generally the savings estimates which were made when the programs were approved, should be continued.

This new reporting will provide information on how costs and benefits vary for different groupings of households. It will support the identification of new services that may be more appropriate to these groupings. It will make more transparent "who is getting what" from the program. This proposal is aligned with the customer segmentation approach to program planning which has been the focus of several utility ESA program studies in the last few years.¹⁴

for participants; and fewer shutoffs, fewer reconnects, fewer notices, and reduction in emergency gas service calls for the utilities.

¹⁴ PG&E ESA program Customer Segmentation study report February 22, 2012, SCE ESA program Customer Segmentation study report December 1, 2011, and SCE ESA program High Usage Needs Assessment Report September 1, 2011.

A preliminary list of household groupings is proposed below. These groupings will continue to be refined by the Working Group, based on stakeholder input.

- 1.MH in Cooling Climate Zones (6, 7, 8, 9 10, 15)
- 2.MH in Heating Climate Zones (1, 2, 3)
- 3.MH in neither (5)
- 4.MH in both Heating & Cooling Climate Zones (4, 11, 12, 13, 14, 16)

- 5.MF 5+ in Cooling Climate Zones (6, 7, 8, 9 10, 15)
- 6.MF 5+ in Heating Climate Zones (1, 2, 3)
- 7.MF 5+ in neither (5)
- 8.MF 5+ in both Heating & Cooling Climate Zones (4, 11, 12, 13, 14, 16)

- (SF includes small MF of 2-4 units)
- 9.SF in Cooling Climate Zones (6, 7, 8, 9 10, 15)
- 10.SF in Heating Climate Zones (1, 2, 3)
- 11.SF in neither (5)
- 12.SF in both Heating & Cooling Climate Zones (4, 11, 12, 13, 14, 16)

Finally, there should be an opportunity in the future to add additional variables to better define logical groupings. The next variable might be the owner/renter designation, as the utilities have indicated program records might make this possible without much additional work. The sorting of ESA program records could take place outside the E3 model. In addition, it may be possible to use pre-program usage data to distinguish which households which use heating and cooling.

The above groupings use Climate Zone designation as a proxy for determining which households are expected to have heating and cooling usage. However, actual household behavior may differ, particularly for low income households that have nonfunctioning heating or cooling equipment.

As a further refinement, it may be possible that by examining individual energy use and bills, program administrators could identify households that have atypical heating or cooling patterns. If such a review reveals a special circumstance (such as elderly or disabled occupants that require year-round heating in a temperate climate), the program administrator could override the climate zone designation and group individual households in heating/cooling/both/neither areas as appropriate.

(End of Attachment A)

ATTACHMENT B

COST-EFFECTIVENESS WORKING GROUP FINAL REPORT

Addendum to ESAP Cost-Effectiveness Working Group White Paper

Working Group Final Recommendations

The White Paper submitted by the Working Group on February 15, 2013 included five recommendations to modify and improve the cost-effectiveness framework used for the ESA Program. Since that time, the Working Group has continued to discuss these five recommendations. This Addendum to the White Paper contains the Working Group's refined recommendations for Energy Savings Assistance (ESA) Program cost-effectiveness framework modifications. Please note that some of the specific recommendations in this addendum are different than the original recommendations in the White Paper and that **recommendations stated here supersede what was stated in the White Paper.**

Executive Summary

The Working Group's recommendations are summarized as:

1. For the 2015-17 cycle, and all subsequent ESA program cycles, the Commission should base ESA program approval on the cost-effectiveness results of the entire program, rather than at the measure level.
2. For the 2015-17 cycle, and all subsequent ESA program cycles, utilities should categorize all measures as resource or non-resource,¹ depending on their ability to provide significant energy savings. This categorization would be reported in the utilities' ESA program applications and updated each cycle, as needed (e.g., if a new measure is added or an existing measure is retired).
3. For the 2015-17 cycle, and all subsequent ESA program cycles, utilities should use the proposed ESA Cost-effectiveness Test (ESACET) and Resource Measure TRC test, rather than the current tests, to assess cost-effectiveness of the ESA program. Similarly, the Commission should use the results of the proposed ESACET and the Resource Measure TRC test to determine ESA program approval.
4. During the 2015-17 cycle, for informational purposes only, utilities should conduct a preliminary, qualitative Equity Evaluation; the results of this preliminary evaluation will be subject to stakeholder comment. The preliminary results and associated stakeholder comments will be used to determine how to proceed in subsequent cycles.
5. For the 2015-17 cycle, the non-energy benefits (NEBs) calculation should remain as it currently is, with the intention to modify the calculation method for future cycles. Prior to the forthcoming Guidance Decision for the 2015-17 cycle, the Working Group will continue to discuss how NEBs could be calculated as a combination of both quantified

¹ As explained in the White Paper Background, the ESA Program, originally created as an 'equity' program, includes measures which may not save energy but provide non-energy benefits such as health, comfort, and safety to program participants. Those measures have been called "equity measures." The Working Group believes changing the term to "non-resource measures" would be more transparent and understandable for decision-makers and the public.

values and an adder. Quantified values will be used for participants' water savings, reduced arrearages for the utility, and fewer customer calls for the utility; the remainder of the NEBs will be valued using an adder.

6. During the 2015-17 cycle, for use in future ESA program cycles, the Commission should fund a study to produce a workable spreadsheet model to replace the currently used modified LIPPT workbook to estimate NEBs and participant bill savings for the ESA program. The study will also address the appropriate value for a NEBs adder and update inputs to the calculations for the three directly estimated NEBs.
7. For informational purposes only, utilities should also report cost-effectiveness results by "household typologies," which could also be thought of as "sub-programs" within the ESA program. The household typologies would cover dwelling type and climate characteristics and will be reported annually. These household typologies would be reported in addition to the cost-effectiveness results of the proposed ESACET and the Resource Measure TRC to better understand ESA program impacts and program design improvements; the household typologies results are informational only and will not be used for program approval purposes.

The Working Group found that several of the recommendations warrant further discussion. As such, the Working Group recommends that we continue to meet on a regular basis with the intent to provide more specific details to the ALJ in this proceeding regarding a few of the recommendations above:

1. Specific thresholds for program approval for the ESACET and the Resource Measure TRC.
2. The appropriate adder value for NEBs.

The Working Group expects to meet monthly, with the potential for additional meetings, as needed, in order to provide additional input prior to the forthcoming ESA program Guidance Decision.

Clarification of Goals

The Working Group was given the goal of making recommendations for improving the ESA Program cost-effectiveness framework. The Working Group has tried to make recommendations that would make the cost-effectiveness framework not only more accurate, but also more transparent to stakeholders. While it is necessary, at times, to use complex models and confidential data, we believe that elements of the ESA cost-effectiveness framework have become overly-complicated, making it difficult for some stakeholders to understand it and thereby making it difficult to achieve full stakeholder participation. Nevertheless, our primary goal remains to increase the accuracy of the cost-effectiveness framework, so as to enable decision-makers to improve the design of the ESA program.

Program Level vs. Measure Level Analysis

Probably the most significant change proposed by the Working Group is the recommendation to base ESA Program approval on the cost-effectiveness of the entire program, rather than approve each ESA measure based on its cost-effectiveness. The Working Group believes that this recommendation will result in a more accurate and realistic analysis of the value of the ESA program. It will allow more flexibility in program design, and should result in a more robust and beneficial ESA Program. It eliminates two major problems in the current cost-effectiveness framework – the difficulty of accurately allocating administrative costs and non-energy benefits (NEBs) to individual measures.

Currently, administrative costs are calculated for the entire ESA Program, and then allocated to individual measures' costs based on the energy savings of that measure. Similarly, NEBs are calculated at the household-level, summed to the program level, and then allocated to individual measures' benefits based on the energy savings of that measure. The Working Group believes that this practice is likely to distort the differences among cost-effectiveness of individual measures. For example, under the current cost-effectiveness framework, measures that provide little or no energy savings but significant health, comfort and safety benefits, are not allocated a significant proportion of administrative costs or NEBs. However, measures with few energy savings are generally included in the ESA program specifically for the NEBs they provide and they theoretically should not cost more to administer than measures with significant energy savings. The Working Group finds that this allocation method does not help decision-makers or the public better understand the cost-effectiveness of the ESA program or measures.

Therefore, as further described in the Update of Recommendation 2, the Working Group is recommending that ESA program approval be based on program-level, rather than measure-level, cost-effectiveness analysis so that this distortion no longer occurs and so the ESA program can be considered more holistically by all stakeholders.

Update of Recommendation 1 (Non-Resource/Resource Categorization)

The ESA program includes measures that provide both energy savings and improved quality of life (e.g., NEBs such as health, comfort, and safety). To better understand which benefits the individual measures provide, the Working Group categorized measures as “resource,” “equity,” or “uncertain” in the White Paper. “Resource” measures are those that are intended to provide energy savings, and bill savings, to participants. “Equity” measures, which we will refer to as “non-resource” measures in this White Paper Addendum, are those that provide little to no energy savings, but significant non-energy benefits, such as health, comfort, and/or safety.² “Uncertain resource” measures are those measures that may provide energy savings in some climate zones and/or utility service territories, but not all.

The Working Group recommends that the initial measure classification proposed by SDG&E in the White Paper (Table 2), with one modification, be used as the initial categorization of measures as “resource,” “non-resource,” and “uncertain.” The modification is to categorize air conditioning measures as “uncertain.” This leaves only two non-resource measures – furnace repair or replace, and hot water heater repair or replace. The results are shown in Table 1.

Table 1: Measure Categorization

Category	Measure
Non-resource	Furnace repair or replace
Non-resource	Hot water heater repair or replace
Resource	Lighting
Resource	Refrigerators
Resource	Hot water conservation measures
Resource	Clothes washers
Resource	Microwaves
Resource	Smart Strip
Resource	Furnace pilot light conversion
Resource	Central AC Tune-up
Uncertain	Air Sealing
Uncertain	Attic Insulation
Uncertain	Duct Test & Seal
Uncertain	Furnace Clean & Tune
Uncertain	Air conditioning in all climate zones

The Working Group reviewed the measure-level cost-effectiveness from the most recent application and found that SDG&E’s initial categorization corresponded to the results. That is, those measures with relatively higher cost-effectiveness values were categorized as resource and

² As explained in the White Paper Background (pg. 6-7), the ESA Program, originally created as an “equity” program, includes measures that may not save energy but provide non-energy benefits, such as health, comfort, and safety to program participants. Those measures have historically been called “equity” measures. The Working Group believes that changing the term to “non-resource measures” would be more transparent and understandable for decision-makers and the public.

those with low cost-effectiveness values were categorized as non-resource. Measures categorized as “uncertain” were measures that were cost-effective in some climate zones for some dwelling types, however, the results were not consistent enough to definitively categorize the measures as either resource or non-resource.

It is expected that many, if not most, of the measures defined here as “uncertain” can be categorized as either non-resource or resource measures for certain climate zones or housing types. We recommend, for the purposes of short-term cost-effectiveness analysis, that in the application for the 2015-17 ESA program, each IOU propose those cases for which an uncertain measure should be categorized as a non-resource or resource measure. For example, we expect that in hot climate zones air conditioning measures are likely to be considered non-resource measures.

The Working Group proposes that a tentative definition of a non-resource measure--subject to further discussion among stakeholders--is any measure that mitigates a substantial health or safety hazard.

Update of Recommendation 2 (Test and Thresholds)

The cost-effectiveness evaluation should align with the goals and objectives of the ESA program while incorporating the perspectives of the various actors and the costs and benefits associated with each. The actors of the ESA program include the participants, the utility and non-participating ratepayers. Costs and benefits that accrue to these actors are: avoided costs of energy saved, measure costs, administration costs, participant NEBs, utility NEBs, and bill savings. Table 2 provides additional detail on which costs and benefits are included in each cost-effectiveness test.

The current cost effectiveness tests--the Utility Cost Test (UCT) and the Modified Participant Test (MPT) together--capture all costs and benefits of the ESA program. However, while the UCT accurately reflects the viewpoint of the utility (and non-participants), the MPT does not accurately reflect the viewpoint of the participant. Instead, the MPT measures the cost effectiveness of the transfer of funds from the utility to the participant.

Retirement of the MPT

Additional background on the MPT test provides context for its existence and why parties believe it should be retired. As noted in D.02-08-034, pursuant to D.01-12-020, the Reporting Requirements Manual Working Group and Standardization Project Team appointed a joint Cost-Effectiveness Subcommittee to consider use of new tests and application of NEBs. The Subcommittee recommended that cost effectiveness testing:

“Calculate UC [*Utility Cost*] and PC [*Participant Cost*] benefit-cost ratios for the program as a whole and for each measure. Because the PC benefit-cost ratio is an undefined

number (participants costs are zero), use a modified PC or ‘PCm,’ whereby the participant benefits are divided by the utility costs.”

The CPUC concurred, writing that:

“... the Subcommittee’s approach to addressing the denominator problem with the PC test produces a benefit-cost ratio that maximizes the participants benefits given the program dollars.”

The Subcommittee’s recommendation was adopted in D.02-08-034 and remains in use today.³

There was general consensus among the Working Group that the MPT should no longer be used as a cost effectiveness test for the ESA program. The MPT deviates from the core Standard Practice Manual (SPM) tests in that it does not fit a single perspective. It uses the costs of the utility and the benefits of the participant in order to measure the cost effectiveness of the utility’s funds in producing benefits for the participant. The MPT does not accurately represent the ESA Program’s cost effectiveness to the participants as they bear no (or very little) costs. It is important to evaluate program impacts on the participant but the Working Group finds that this may not be best illustrated with a cost-effectiveness benefit cost ratio.

The UCT does not have the structural perspective issues associated with the MPT. While the test does provide a reasonable estimate of the benefit to the program from the perspective of non-participating ratepayers, placing priority on this perspective would not be consistent with the goals and objectives of the ESA program. Thus, the Working Group does not recommend using the UCT to analyze cost-effectiveness for the ESA Program. Instead, the Working Group proposes two new tests, which we believe will better represent all actors and Commission objectives below.

Proposed New Cost Effectiveness Tests

Most Working Group members believe there is a need for new cost-effectiveness tests in order gain consistency with the core energy efficiency portfolio approval and that of other DSM programs. First, the Working Group recommends use of an ‘all-in’ test or a modified version of the TRC (the ESACET defined below). The ESACET would include all costs and benefits, including participant and utility NEBs, associated with the ESA program and therefore the perspectives of the utility, participant, and non-participant. The second proposed test is a TRC test applied only to “resource” measures (refer to Table 1) and without the inclusion of any NEBs. The Working Group finds that the ESACET and the Resource Measure TRC to be more appropriate than the current tests because one reflects the perspective of all actors in the ESA program and the other reflects the value of the ESA program as a resource procurement program.

³ D.12-08-034, page 15, “In sum, we find that the Subcommittee’s modified PC test is consistent with the purpose defined by this Commission. It makes use of the tests defined in the Standard Practice Manual, while appropriately compensating for the insufficiency of the PC to be defined as a benefit-cost ratio without some modification.”

The ESA Cost-Effectiveness Test (ESACET)

The Working Group recommends reporting program cost effectiveness using the ESACET, which includes participant and utility NEBs. In addition, the ESACET includes “copayments,” which are the portion of the measure costs that are paid by landlords or third parties. The ESACET would include all the costs and benefits--both energy and non-energy--associated with the ESA program, and it is therefore comparable with the TRC currently used for evaluating other energy efficiency programs. The Working Group finds that it represents the perspective-based analysis that is foundational within the core SPM.

The Working Group believes it is logical to start with the TRC test, then add the participant and utility NEBs to account for health, safety, and comfort benefits--provision of which are also goals of the ESA Program. A test based on the TRC--which is used for all demand-side programs--with modifications appropriate to the ESA program, provides a strong foundation that the Working Group finds will facilitate acceptance of this test as a means to evaluate the total resource efficiency of the ESA Program. Table 2 shows the results of the ESACET using data from the utilities’ 2012 program. Please note that because the results in Table 2 are based on 2012 program data, they are for illustrative purposes only to show what the ESACET results would have looked like for the 2012 ESA Program. The results in Table 2 may not reflect program cost-effectiveness of any future ESA Program applications.

Table 2: ESACET Results for 2012 ESA Program

PG&E	SCE	SDG&E	SoCalGas
0.73	0.80	0.86	0.68

The Resource Measure TRC

The Working Group also recommends reporting program cost effectiveness using the Resource Measure TRC. This test is identical to the traditional TRC, but would exclude administrative costs and only be applied to resource measures. The Working Group finds that since the primary purpose of resource measures is to produce energy savings and avoid supply side costs, they should be evaluated without the inclusion of NEBs. The Resource Measure TRC evaluates the ESA program as a resource program, which is consistent with Commission goals.⁴

The Working Group believes that at least one ESA program cost-effectiveness test should focus solely on the resource measures, without administrative costs, because they are designed to produce energy and bill savings, a specific Commission goal. This way the program’s energy-

⁴ “Today we clarify that the complementary objectives of LIEE [*Low Income Energy Efficiency*] programs are to provide an energy resource for California, consistent with our “loading order” that establishes energy efficiency as our first priority, while reducing low-income customers’ bills and improving their quality of life.” (D.07-12-051, p. 2)

“The LIEE programs will be an energy resource by delivering increasingly cost-effective and longer-term savings.” (California Energy Efficiency Strategic Plan, January 2011 update, Section 2, pp. 23-24)

related benefits are more transparent to decision makers and stakeholders. We believe that the Resource Measure TRC is better suited for assessing impacts of the ESA program as an energy efficiency program.

Based on the illustrative results run using data from the utilities' 2012 programs, the percentage of the ESA program funding supporting "resource measures" is less than half of the cost of the program. Please note that this test does not consider administrative costs.

Table 3: Portion of the ESA Program costs* comprised of "resource measures"

PG&E	SCE	SDG&E	SoCalGas
24%	30%	48%	16%

Table 4: Resource Measure TRC* Results for 2012 ESA Program

PG&E	SCE	SDG&E	SoCalGas
0.75	1.23	1.63	0.67

*Excluding Administrative Costs

Results in Tables 2 and 4 reflect 2012 program data and likely do not reflect program cost-effectiveness in the 2015–2017 program applications for various reasons, including but not limited to possible revisions in measure offerings, the lack of program administrative costs, and revised energy savings impacts for measures based on the Impact Evaluation of the 2011 ESA Program currently underway. These are illustrative examples only, based on data from 2012, and likely do not reflect the cost-effectiveness of any future ESA Program applications.

Presenting the Participants Perspective

Since the Working Group recommends retiring the MPT, we were concerned that the participant's perspective would not be uniquely presented. Since participant well-being remains a program priority, we find that it is important to continue to evaluate program impacts on the participant. The SPM cost-effectiveness test from the participant perspective, the Participant Cost Test (PCT), includes all costs incurred by--and benefits accruing to--program participants. A problem specific to the ESA Program is that participants bear no (or very little) cost. Because participant costs are essentially zero, it is not possible to determine a useful benefit cost ratio using the PCT.

The Working Group recommends that, for informational and tracking purposes only, the IOUs continue to report participant bill savings in the Annual Report. We believe that this will help decision-makers and stakeholders better understand the benefits to the participants and any potential trends in participant bill savings over time. The Working Group does not, however, recommend that the participant bill savings be used for program approval purposes.

Table 5 below details the costs and benefits analyzed in the current and proposed cost-effectiveness tests used in the ESA program. As shown, all costs and benefits analyzed in the current tests would also be analyzed in the proposed tests

Table 5: Costs and Benefits in the ESA Program Cost-effectiveness Framework

	Current Tests			Proposed Tests	
	TRC	MPT	UCT	ESACET	Resource Measure TRC
Administrative costs	COST	COST	COST	COST	
Avoided costs of supplying electricity	BENEFIT		BENEFIT	BENEFIT	BENEFIT
Net Bill Reductions		BENEFIT			
Capital (measure) costs to landlords/ 3 rd parties	COST*			COST	
Capital (measure) costs to utility	COST	COST	COST	COST	COST
Participant non-energy benefits		BENEFIT		BENEFIT	
Utility non-energy benefits			BENEFIT	BENEFIT	

**Costs of third parties have been included, although not consistently, by some utilities.*

Thresholds

The Working Group recommends that only the ESACET and the Resource TRC test be used in determining the cost-effectiveness of the ESA program. The ESACET test includes all costs and benefits and represents all perspectives. The Resource Measure TRC prioritizes energy savings and evaluates the program as a resource.

The Working Group is continuing to discuss possible combinations of the proposed tests to determine a recommendation regarding the best approach for ESA Program approval. However, we agree that we do not have enough information at this point to set a threshold, given that any threshold could potentially require significant program design modifications. As such, the Working Group proposes that we continue to discuss this issue on a monthly basis and submit a supplemental recommendation to the ALJ before the forthcoming Guidance Decision. This will allow time for the Working Group to consider the results of the Impact Evaluation, the proposed NEBs adder (see below), the Multifamily Study, and how the other recommendations

included in this White Paper Addendum (such as measure categorization) may impact the ESA program.

Outstanding questions include:

- Should the threshold for ESA program approval be “firm” (e.g. the benefit-cost ratio on a particular test or tests must be greater than a certain number), or should it be based on past performance (e.g., the benefit-cost ratio on a particular test or tests must be greater in one year than it was in a previous year), or something else?
- To what extent should the threshold for ESA program approval be based on tests which include only resource measures, and to what extent on tests which include both resource and non-resource measures?

Update of Recommendation 3 (Equity Evaluation)

The intention of the Equity Evaluation is to provide an additional level of analysis of relatively qualitative non-energy benefits (e.g., health, comfort, and safety) and to address the difficulty of monetizing all relevant non-energy benefits. We recognize that there may be some overlap between the Equity Evaluation and the NEBs calculations. However, since we are recommending that tests such as the ESACET be applied on the program level, and the Equity Evaluation applied on the measure level, we do not think that any overlap will result in any sort of double-counting of benefits. Additionally, we recommend that at least for the 2015-17 program cycle, the Equity Evaluation be used for informational purposes only to better understand program impacts and design, and that the Equity Evaluation not be used for ESA program approval.

The White Paper included general recommendations for both the 2015-17 program cycle and for the post-2017 period. This Addendum focuses on the Working Group’s recommendation for the 2015-17 program cycle. . We propose that, during the 2015-17 program cycle, all measures be assessed based on the following four criteria:

1. *Eliminates combustion-related safety threat* – Prolonged exposure to high levels of carbon-monoxide (CO) can have adverse effects on human health, including CO poisoning that can lead to severe headaches, fatigue, shortness of breath, dizziness, and nausea. Extended and severe exposure can lead to permanent neurological damage and even death. Ambient air readings in participant homes should not exceed certain maximum ambient air CO levels, both in the center of the room(s) and near combustion appliances. A Natural Gas Appliance Test (NGAT) is performed to check for dangerous levels of CO. Any or all faulty natural gas-fired water heaters or furnaces that contribute to excessive levels of CO in the room(s) are shut off, becoming candidates for ESA repair or replacement. If ventilation/infiltration measures have been installed, a second NGAT

will be conducted to ensure that tightening the building envelope did not adversely affect operation of any gas appliances.

2. *Eliminates fire safety threat/Improves home security (crime prevention) and building integrity* – While not necessarily within the scope of the ESA program at present, non-resource measures may address specific safety issues such as fire safety and improved home security/building integrity. This would include fire safety from hazards in the home with the exception of natural-gas combustion. An on-site property assessment, similar to what is performed as part of the ESA program, would identify fire safety threats and home security issues, including poor exterior lighting, broken/unsecure windows and doors, inadequate/makeshift heating and cooking devices, and structural deficiencies.
3. *Reduces or eliminates extreme temperatures and temperature variations inside the home/improves customer ability to manage in-home temperatures* – Extreme temperatures in the home can lead to significant adverse health effects, including cold stress/hypothermia and heat stress/hyperthermia. Infiltration measures can help reduce temperature variation by minimizing air leakage into and out of the building envelope. Additionally, measures that reduce or eliminate extreme temperatures may also mitigate issues that arise from the use of inadequate, faulty and makeshift heating and cooling devices, leading to increased safety/security and decreased incidences of fire and asphyxiation. Attic insulation may help by decreasing the amount of conditioned air lost in the summer and the winter. Additional measures that address extreme temperatures may include new windows and heating/cooling units.
4. *Improves air quality, ventilation and/or air flow (e.g., reduces drafts and leakage)* – Poor air quality, ventilation and air flow can lead to increased health risks from mold, dust mites, and other contaminants. These risks may be mitigated by reducing the number of entry points for pollen, insects, rodents and other pests. Improved air quality and ventilation may also diminish condensation. Measures in this category, such as new windows and doors, duct sealing, and improved temperature/humidity control, may address one or more air quality issues, and can help reduce temperature variation by minimizing air leakage into and out of the building envelope. Reducing temperature variation within the home may also minimize the flow of warm air to cool spaces.

The Working Group recommends that the Equity Evaluation be performed by rating the extent to which every ESA measure achieves each particular health or safety improvement. A rating of “5” indicates that the measure almost always results in that particular improvement. In other words, almost all homes which receive the measure will see that improvement. For example, a measure which replaces faulty natural gas appliances would receive a “5” on criteria #1. Another way to think about a score of “5” is that it indicates that a measure has an extremely high probability of achieving the improvement in a home when it is installed.

A rating of “3” indicates that the measure results in that particular improvement for about half the homes which receive it. For example, if a measure which provides insulation will likely reduce the occurrence of extreme temperatures in about half the homes where it is installed, that measure would receive a “3” on criteria #3. For certain measures, a more useful way to think about a score of “3” is that it indicates that a measure has about a 50% probability of making the improvement in a home when it is installed. For other measures, it may be more appropriate to think of a score of “3” as a result of a measure that partially achieves the improvement. For example, a measure may result in moderate, but not extreme, improvements in temperature variation in each home.

A rating of “1” indicates that the measure results in that particular improvement for only a small number of homes which receive it. For example, if a measure which replaces non-energy-efficient appliances results in the replacement of appliances which are actually fire hazards about 10% of the time, that measure would receive a “1” on criteria #2. For certain measures, a more useful way to think about a score of “1” is that it indicates that a measure has less than 25% probability of making the improvement in a home when it is installed. For other measures, it may be more appropriate to think of a score of “1” as a result of a measure that somewhat achieves the improvement. For example, a measure may result in a small improvement in temperature variation in each home.

The Working Group recommends that the utilities attempt an Equity Evaluation based on the criteria and rankings identified above for *all* ESA 2015-17 Program measures during the 2015-17 program cycle, whether they are classified as non-resource, resource or uncertain. Utilities will base the Equity Evaluation on their understanding of and experience with the ESA Program measures in their respective territories. We believe that this will provide valuable information about each measure that can assist us in better classifying and analyzing each measure in the future.

The Working Group also recommends that the utilities use their discretion to group the measures for the purpose of the Equity Evaluation. For example, some measures (e.g., lighting) provide the same benefits across the state, and it would not be sensible to provide a separate Equity Evaluation for each climate zone and every type of housing. Some measures are weather-sensitive, or have different impacts in different housing types, and maybe require a more granular evaluation.

The Equity Evaluation, particularly for the 2015-17 program cycle, is likely to be somewhat subjective and clearly experimental. For this reason, the Working Group further recommends that all stakeholders be encouraged to comment on the utilities’ Equity Evaluations, and provide their own scores or suggestions for grouping measures. We hope that through this stakeholder process, we can come to better understand the true value of each ESAP measure, and eventually improve the design of both the individual measures and the overall ESA program so as to provide the maximum value to program participants.

The Equity Evaluation results are not intended to be used as the sole determinant of whether a measure should be included in the ESA program because it provides health, comfort, and/or safety benefits. Rather, it is intended to provide additional information about ESA Program measures which, in conjunction with other data, could be used to better understand program impacts, make a determination about measure inclusion in the ESA Program, and/or improve measure or program design.

Update of Recommendation 4 (Non-Energy Benefits)

Recommendations for treating NEBs in the cost-effectiveness calculations are presented below. Where applicable, the recommendations are further specified by short term and long term periods.

In general, the recommendation is to estimate a few specific NEBs directly and to provide an adder that will estimate other NEBs which would be difficult or expensive to quantify. The NEBs recommended to estimate directly include:

- Water savings for the participant household,
- Reduced arrearages costs for the utility, and
- Fewer customer calls for the utility.

Each of these along with the adder is described in more detail below.

Water Savings

Water savings for the participant household are currently calculated in the modified Low Income Public Purpose Test (LIPPT) workbook in the following manner:

- The number of annual gallons of water saved per faucet aerator is added to the number of annual gallons of water saved per showerhead; this amount is then multiplied by the percentage of program participants who received these measures.
- The annual gallons of water saved are divided by 748 to convert them to hundred cubic feet (ccf).
- The ccf are then multiplied by an average water and sewer rate; the original average rate was determined in 2000 and has been escalated each year since then by approximately 38 percent.
- The present value of the savings over the life of the benefit (in this case, three years has been used) is then calculated.

The recommendation is to use the same calculation. In the short term, the calculation will be made with the values that are currently used in the modified LIPPT model. In the long term, the calculation will be modified by making the following updates:

- Estimate the annual gallons of water saved for faucet aerators, showerheads, high efficiency washers and thermostatic shower valves.
- Estimate the average water and sewer rate; this will vary by area.

Reduced Arrearages

Reduced arrearages costs for the utility are calculated in the modified LIPPT workbook in the following manner:

- The average arrearage dollar value for low income customers is estimated by the utility.
- The average arrearage value is multiplied by the percentage of arrearages reduced by the program. This percentage was estimated as 28% when the LIPPT model was developed and is an average of 23 values reported in the literature during the period 1991 through 1999.
- The result is multiplied by an estimated interest rate for the utility to carry the cost (8.15% was used when the LIPPT model was developed).

The recommendation is to use the same calculation. In the short term, the calculation will be made with the values that are currently used in the modified LIPPT model. In the long term, the calculation will be modified by making the following updates:

- Average arrearage dollar value for low income customer; this will vary by utility;
- Program impact on arrearages; and
- Utility interest rate.

Fewer Customer Calls

Fewer customer calls for the utility are calculated in the modified LIPPT workbook in the following manner:

- The average number of calls from low-income customers per year is estimated by the utility.
- The average number of calls is multiplied by the percentage of calls reduced by the program. This percentage was estimated as 25% when the LIPPT model was developed and is an average of 25 values reported in the literature during the period 1990 through 2000.
- The result is multiplied by the marginal cost per customer call as estimated by the utility.

The recommendation is to use the same calculation. In the short term, the calculation will be made with the values that are currently used in the modified LIPPT model. In the long term, the calculation will be modified by making the following updates:

- Average number of calls from low-income customers per year; this will vary by utility;

- Program impact on number of calls; and
- Marginal cost per customer call; this will vary by utility.

Adder to Estimate Remaining NEBs

The recommendation is to develop an adder to estimate the remaining NEBs which are difficult or expensive to estimate. To get an idea of what NEBs are currently being estimated, the results of the cost-effectiveness analyses for the 2012 Annual Report were reviewed. Table 2 shows some selected values from those analyses.

Table 6: Values from ESA Cost Effectiveness Analyses for the 2012 Annual Report (dollars)

	Water NEB	Arrearages NEB	Customer Calls NEB	Remaining NEBs	Electric Avoided Cost Benefits	Gas Avoided Cost Benefits	Total Avoided Cost Benefits
SDG&E	761,087	290,448	665,074	5,343,201	9,262,638	2,234,338	11,496,975
SCG	4,448,053	468,143	3,551,226	36,365,554	n/a	9,874,792	9,874,792
PG&E	4,004,747	6,645,918	1,553,654	37,279,741	31,787,104	10,816,705	42,603,808
SCE	141,353	2,830,385	1,104,194	3,957,960	22,459,280	n/a	22,459,280

In reviewing these results, a number of scenarios were considered, including separate adders for electric and gas, for participants and utilities, or for the four IOUs. Other considerations included whether the adder should be a percentage of bill savings or avoided costs and whether it should result in a set of similar estimates or estimates that are larger or smaller than what is currently used. None of the scenarios considered resulted in a basis for NEBs that was not arbitrary or demonstrated to improve the current methodology, and the working group concluded that more discussion and analysis was needed to develop a reasonable basis for the adder.

Therefore, in the short term, the recommendation is for this Working Group to continue to meet on a regular basis for the remainder of 2013 to discuss a working recommendation and basis for developing the adder. In the long term, the recommendation is to fund a study to produce a workable spreadsheet model to replace the currently used modified LIPPT workbook. The study could additionally research what is currently used in other programs, the recent relevant literature, and perform a more in-depth analysis on ESA program data and results from the four ESA studies currently underway,⁵ each of which could potentially inform a better understanding of the benefits resulting from the program. It is also recommended that this study review and update the inputs to the three directly estimated NEBs described above. The result of the study would be a report describing the development of the adder and the other updated values, and a spreadsheet for calculating NEBs and participant bill savings that can replace the currently used modified LIPPT model. This study should be funded in the 2015 to 2017 program cycle.

⁵ The four studies include an impact evaluation, research on the multi-family sector, an evaluation of energy education, and a comprehensive low-income needs assessment.

Summary of Recommendations for NEBs

Overall: Directly estimate the three NEBs of water savings for participant households, reduced cost of arrearages for utilities, and reduced cost of customer calls for utilities. Develop an adder to estimate the remaining NEBs.

Short-term: Continue to use the modified LIPPT model as needed while the Working Group continues to meet regularly this year to discuss an appropriate basis for a NEBs adder.

Long-term: Fund a study in the 2015 to 2017 program cycle to deliver the following:

- A summary of findings and recommendations related to the estimation of NEBs and cost-effectiveness tests for the ESA program based on current industry practice, recent literature, an in-depth analysis of program data, and results from the four ESA studies completed in the 2012 to 2014 cycle.
- Updated inputs to the calculations for the three directly estimated NEBs;
- Adder(s) to be used for estimating remaining NEBs;
- A spreadsheet model to take the place of the currently used modified LIPPT model for estimating NEBs and participant bill savings for the ESA program.

Update of Recommendation 5 (Household Typology Reporting)

The Working Group recommends reporting program-wide cost-effectiveness results by groups of aggregated measures called “household typologies.” Essentially, the total program will be divided according to a few key characteristics such as dwelling type and/or climate area and cost-effectiveness will be reported for these sub-program types. This will allow stakeholders a quantitative overview of select program parts without an overwhelming list of cost-effectiveness values.

The ESA program is statewide and serves a variety of dwelling types. As described in the background section, it is also a comprehensive program in that the program offers building shell services, many appliances, as well as energy education. The utilities currently report cost-effectiveness annually at a program level. Approximately every three years they also report cost-effectiveness at the very granular level of utility, climate zone, dwelling type, owner type, and, in some instances, fuel type. Depending on utility, the number of cost-effectiveness values reported at the granular level is between 70-150 values.

Cost-effectiveness reporting of a few select segments of the program will provide stakeholders additional information about program performance and allow stakeholders to differentiate among more or less cost-effective parts of the program in a simple manner. By segregating cost-effectiveness by program characteristics, stakeholders will have a better idea of where the most costs are accrued. It will give an idea of where the most potential for cost-effective energy efficiency installations is likely to occur. It will allow program evaluators to explore the impact

of overall cost-effectiveness of modifying program characteristics. If the cost-effectiveness values reported for some sub-program types are similar or identical, stakeholders can see that the program characteristics defining sub-programs do not impact costs or benefits.

The proposal is to segregate the benefits and costs into the following groupings for assessment:

- Dwelling type
- Climate characteristics (e.g., large amount of heating required, minimal cooling required)

The Working Group also explored additional groupings

- Fuel impacted
- Weather-sensitive, non-weather-sensitive measures
- Type of fuel used for heating the dwelling

The Working Group also analyzed the various combinations of groupings and decided that the simplest divisions are the most appropriate at this time.⁶ The Working Group recommends two separate divisions of the program, one by dwelling type and one by climate area.

Preliminary examples of this segregated analysis are provided below, using the data from the 2012 program year. The sub-program assessment would utilize the ESACET recommended in this Addendum for overall program approval. However, the ESACET includes administrative costs. If it were to be used for sub-program reporting, the administrative costs would need allocation among the sub-program types. As described in the beginning of this document, in the “Program Level versus Measure Level Analysis” section, the allocation of administrative costs by energy savings creates benefit distortions to various program elements. The administrative (or non-measure costs) comprise approximately 30% of the portfolio. Therefore, the Working Group recommends assessing sub-program components using the ESACET test with and without administrative costs.

Table 7: Illustrative Example of ESACET Cost-effectiveness Results by Dwelling Type

Utility	Multifamily	Single Family	Mobile Home	ESACET without admin costs	ESACET with admin costs
PG&E	0.68	1.00	1.11	0.96	0.73
SCE	1.15	1.13	1.01	1.12	0.80
SoCalGas	2.02	0.84	1.36	0.95	0.68
SDG&E	2.63	1.1	1.51	1.29	0.86

⁶ The utilities may be able to provide data that allows for additional groupings on an as-needed basis.

The household typology assessment would also segregate values according to climate areas. This Working Group consolidated the California Energy Commission's sixteen building climate zones into three areas for ease of assessment. These three areas are:

Climate Area Description	CEC Climate Zone
Heating & Most Cooling	11 - 16
Some heating & some cooling	6 - 10
Most Heating & Minimal Cooling	1 - 5

These climate areas are based on the number of Heating Degree Days and Cooling Degree Days for four representative cities within each Climate Zone and match the climate areas created for the ESA Impact Evaluation of the 2009 program year.

The Working Group recommends that the household typologies cost-effectiveness results be reported for informational purposes only, in addition to the program level cost-effectiveness results of the ESACET and Resource Measure TRC, discussed in Recommendation 2 of this Addendum. These results would be reported annually on a prospective basis only, beginning with program year 2015.

In conclusion, exploring ways to analyze sub-components of the ESA program may provide several advantages. It will provide information to those interested in particular dwelling types or regions. There may be a particular public interest in certain dwelling types of regions of the state. It may highlight areas of the program to reform or adjust to help the portfolio reach required thresholds. Specifically, it may help demonstrate which parts of the program generate the most benefits, and how this allows other, less cost-effective services and installations to occur.

(End of Attachment B)